United States Environmental Protection Agency

Water Health and Economic Analysis Tool

Purpose

The U.S. Environmental Protection Agency (EPA), in collaboration with drinking water and wastewater (water) sector partners has developed the Water Health and Economic Analysis Tool (WHEAT). The tool is designed to assist drinking water utility owners and operators in quantifying public health impacts, utility financial costs, and regional economic impacts of an adverse event, based on a variety of asset-threat combinations that pose a risk to the water sector. Existing WHEAT modules currently analyze two event scenarios – the release of a hazardous gas and the loss of operating assets in a drinking water distribution system – and provide information that can be used as part of a comprehensive risk assessment. Future WHEAT modules will analyze drinking water contamination and wastewater system hazardous gas releases and loss of operating assets scenarios.

The WHEAT methodology, summarized in **Figure 1**, uses a step-by-step process that assists users in conducting a consequence analysis. Users are able to easily enter information about their utility, build and run a consequence analysis scenario, and generate a report that summarizes the potential public health impacts (i.e., injuries and fatalities), utility financial costs, and regional economic impacts.

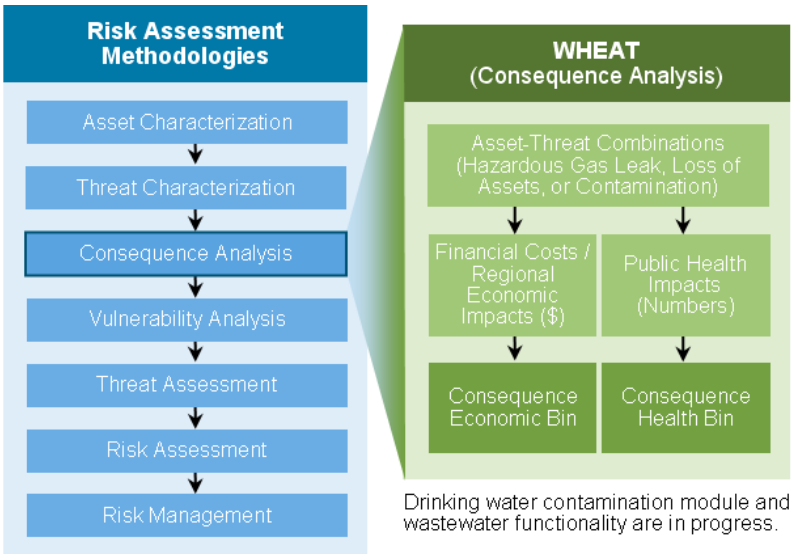

Figure 1: WHEAT will integrate seamlessly into water sector risk assessment methodologies.

WHEAT Consequence Analysis Process

The loss of operating assets module estimates economic consequences; the hazardous gas release module estimates public health and economic consequences. Utility financial costs are based on the extent and duration of loss in water service and the extent of damage to operating asset(s). The tool considers impacts to water sales revenues, changes in utility operating costs during an incident, and infrastructure repair and replacement costs. Regional economic impacts are proportional to the extent and duration of disruption of normal water service and take into account the resilience of affected businesses and their ability to adapt to an adverse event. WHEAT includes six main steps to perform a consequence analysis. These steps and the associated functions are described below and are illustrated in **Figure 2**.

1. **Utility Information** – Users input basic utility operational information, including population served, volume of demand, and area covered, as well as financial inputs including revenues, expenses, and costs.

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2. **Scenario Selection** – Users select a scenario for analysis (hazardous gas release or loss of operating assets), then specify the particular hazardous gas scenario and utility assets affected.
3. **Water Service Restrictions and Restoration Profile** – Users specify the likely effects the incident might have on service, including any outages or restrictions. Users are then asked to indicate the likely response actions that would be taken by the utility and the approximate time it would take to provide regular service.
4. **Public Health Consequences Analysis** – Calculates public health consequences of the proposed incident in terms of the estimated number of injuries and fatalities. Public health consequences are directly linked to the number of people exposed and the type, overall quantity, concentration, and duration of exposure to the hazardous gas release scenario defined by the user.
5. **Economic Consequences Analysis** – Calculates economic consequences of hazardous gas releases and loss of operating assets in terms of utility financial costs and regional economic impacts. Economic consequences are directly linked to the duration and extent of disruption in regular water service resulting from the proposed incident.
6. **Summary Reports** – Includes a summary of user-provided utility information and a report detailing the health and economic consequences resulting from the proposed incident. Results are presented within standardized health and economic consequence bins under the Risk Analysis Management for Critical Asset Protection framework – providing compatibility and consistency with water sector risk assessment tools (e.g., VSAT, SEMS, and RAM-W).

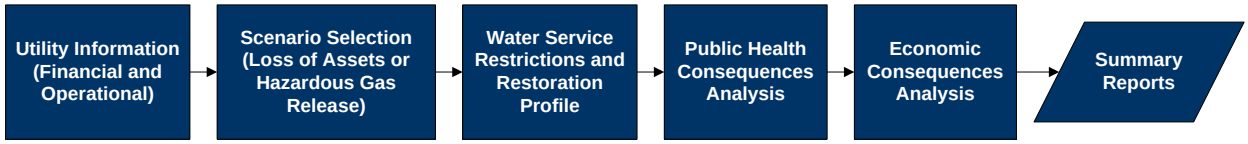

Figure 2: WHEAT Consequence Analysis Process

Features

- Provides a step-wise tutorial to build scenarios by asking users a series of questions related to their specific utility. Where appropriate, WHEAT provides users with preliminary estimates;
- Allows users to analyze the consequences of the release of a hazardous gases and loss of operating assets for drinking water systems;
- Enables users to save and reuse utility information for multiple analyses;
- Allows users to save input data at any point during the process and return at a later time;
- Creates summary reports in Microsoft Excel format;
- Generates a single report that includes multiple analyses; and
- Includes a help page at each step of the analysis to guide the user.

Contact

WHEAT will be available for download, and is scheduled for release in the fall of 2010.
For more information, contact Curt Baranowski of EPA at baranowski.curt@epa.gov.